

## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is used for the headgear for electroencephalogram measurement for taking out the bioelectricity signal (electroencephalogram signal) from the scalp as a living body especially about the living body electrode structure for taking out the biomedical signal from a living body, and the headgear for electroencephalogram measurement, and relates to useful living body electrode structure and the headgear for electroencephalogram measurement.

[0002]

[Description of the Prior Art] An advance of the technique which takes out a biomedical signal from the front face of human being's body as an electrical signal, and measures a bodily condition has a remarkable thing in various fields. It is possible to also observe human being's feeling quantitatively by measuring an electroencephalogram in it.

[0003] In order to take out a biomedical signal from body front faces (skin etc.), contact arrangement of the electrode is carried out on a body front face in many cases, and in order to take out a very delicate signal faithfully, the careful attentions including the ingredient are paid also for electrode structure.

[0004] In order to take out an electroencephalogram signal as this conventional kind of electrode structure, two or more electrodes are arranged in the headgear for electroencephalogram measurement, by what this headgear for electroencephalogram measurement is attached in a head for (it fogs), contact arrangement of the electrode is carried out at the predetermined part of the scalp, and the electroencephalogram signal is outputted to external electric processors (amplifier etc.) through lead wire.

[0005] since the range where a head be large be cover as a conventional headgear for electroencephalogram measurement, the structure which applied conductive paste be common in the part which attach two or more electrodes in the network cap beforehand, and contact the body front face of an electrode, and the biomedical signal acquire through an electrode in the condition of having been covered with the network cap be take out from lead wire, and it output to external amplifier etc.

[0006] Moreover, other examples of electrode structure of the headgear for electroencephalogram measurement are indicated by JP,10-165386,A. In this example, the piece of the felt which poured in the gel which has a fluidity is prepared in the interior of the lobe prepared in each of two or more electrodes, and at the time of measurement, as this piece of the felt carries out contact press at the scalp, while mitigating the displeasure at the time of headgear wearing, long duration wearing is permitted.

[0007]

[Problem(s) to be Solved by the Invention] However, in the former conventional example, in order that a conductive paste may contact the scalp directly, a conductive paste remains also after measurement. It does not obtain. a shampoo -- needed -- being not only complicated but specific electroencephalogram measurement -- setting -- many electrodes -- not using it -- In the case of the headgear constituted from a cap which attached the electrode beforehand, although it could equip in a short time, when an electrode was attached separately, wearing time amount became long, and there was a fault of forcing a great burden upon a test subject.

[0008] moreover, the time of a paste removing an electrode -- it -- the hair and the scalp -- the

problem of remaining upwards occurs.

[0009] on the other hand, also in the case of the latter conventional example, although a paste is not used, a conductive solution should make it temporary -- to the displeasure of adhering, it is unchanging and the felt of the letter of a protrusion is still more direct -- for the \*\* reason by which press contact is strongly carried out to the scalp, by the measurement of long duration performed using many electrodes, there was a test subject, also when the unpleasant feeling of wearing had to be borne.

[0010] By the way, as for the above-mentioned living body electrode, contacting directly was important for the scalp, but in these conventional examples, since the scalp was covered with the hair, direct contact was difficult and needed the activity which pushes aside the hair in advance and exposes the scalp.

[0011] The problem is being able to say to a living body at large [, such as not only when / above / the scalp is assumed as a living body, but the skin, ] variously.

[0012] Then, not only the direct contact to a living body is possible, but the purpose of this invention has wearing in offering easy living body electrode structure.

[0013] The purpose of this invention abolishes the need for the shampoo after measurement, and it aims at offering the headgear for electroencephalogram measurement which does not give an unpleasant feeling of wearing while it makes wearing easy.

[0014]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the following characteristic configurations are used for the living body electrode structure and the headgear for electroencephalogram measurement by this invention.

[0015] (1) Living body electrode structure which has the plug section which has a connection terminal for outputting outside the electrical signal acquired by the other end by said polar zone in fitting and the polar zone for being stopped and taking out the electrical signal from a living body at the end inside the cartridge-like receptacle section which has shaft-orientations opening and has the cross-section configuration of arbitration, and said receptacle section, and grows into it.

[0016] (2) Said receptacle section is the living body electrode structure of the above (1) which is the two-layer structure of the container liner section and the outer case section.

[0017] (3) Said polar zone is the above (1) or the living body electrode structure of (2) of being a silver-silver chloride electrode and contacting a living body through the gel matter.

[0018] (4) Said plug section is the above (1) which has the press member which presses said polar zone thru/or one living body electrode structure of (3).

[0019] (5) To the receptacle section of the above (1) attached in the mesh-like cap [ network ] thru/or one living body electrode structure of (4), said plug section is fitting and the headgear for electroencephalogram measurement which is stopped and changes.

[0020]

[Embodiment of the Invention] Hereafter, the example of the living body electrode structure concerning this invention and the headgear for electroencephalogram measurement is explained to a detail with reference to an accompanying drawing.

[0021] Drawing 1 is drawing in which showing the living body electrode structure concerning this invention, and 1 operation gestalt of the headgear for electroencephalogram measurement, being an example of application to the headgear for electroencephalogram measurement for taking out an electroencephalogram signal, and showing the condition of having equipped the test subject with this headgear for electroencephalogram measurement.

[0022] The network cap 3 which constitutes the headgear 2 for electroencephalogram measurement which has elasticity is put on a test subject's head 1, and flexible wearing which matched the head configuration of a test subject proper is performed.

[0023] Two or more connector-type electrodes 4 for covering the measuring object part of a head (scalp) are distributed by the network cap 3, lead wire 5 is connected to each electrode 4, and an electroencephalogram signal is outputted to an external electroencephalogram signal processor etc. through the feed-thru connector 6 on which each lead wire is centralized (it bundles) (not shown).

[0024] Drawing 2 is drawing for explaining the living body electrode structure which becomes this invention, and is the decomposition perspective view of each electrode 4 attached in the network cap 3 shown in drawing 1. Moreover, drawing 3 is a sectional view in the condition of having set the electrode structure 4 as shown in drawing 2 to the head.

[0025] The electrode 4 is fundamentally made into the connector configuration divided into plug section 4P and receptacle section 4R. Receptacle section 4R is arranged in the predetermined part of the network cap 3, and plug section 4P fit into each of receptacle section 4R, and it is stopped. This fitting is performed like the arrow head of the two-dot chain line in drawing by doubling the height 452 of receptacle section 4R with the notching section 414 of plug section 4P.

[0026] Plug section 4P are equipped with the axis end child 411, E form snap ring (E form washer) 412, the knob section 413, the notching section 414, a coil spring 415, the maintenance metallic ornaments 416, the silver-silver chloride electrode chip 417, and the gel sheet 418, and are constituted. The gel sheet 418 is pressed by the suitable pressure for the scalp with a coil spring 415, and enables electric detection of an electroencephalogram signal. The axis end child 411 constitutes a part for the principal part of these plug section 4P, in order to make connection of lead wire 5 easy, slot 411A is formed in the upper part, and the silver-silver chloride electrode chip 417 is formed in fitting and the maintenance metallic ornaments 416 to hold at the other end side.

[0027] Cross sections are arbitration, such as 2 molds, a KO mold, and cylindrical, that the configuration of the maintenance metallic ornaments 416 fits in, and just holds the silver-silver chloride electrode chip 417 here.

[0028] In addition, since the current from the amplifier of an electroencephalograph generates an electric double layer in electroencephalogram measurement in the interface of an electrode and the skin and unnecessary polarization voltage arises, in order to prevent generating of this polarization potential, the silver-silver chloride electrode which is a non-polarization pole is used.

[0029] A cross section has the major-diameter disk section of a convex type configuration, and the minor diameter disk section (cylindrical lobe) formed on it, and the silver-silver chloride electrode chip 417 is formed by resin. The front face of the major-diameter disk section resin of the silver-silver chloride electrode chip 417 which has this configuration adheres to the silver-silver chloride. With the cylindrical shape lobe in the disk section of the silver-silver chloride electrode chip 417, the gel sheet 418 is formed in a part for the flat part on the rear face of the major-diameter disk section of the opposite side in one. By carrying out like this, it becomes possible easily to exchange this unification part for every test subject, and it is made into desirable structure also in respect of health.

[0030] In the above-mentioned unification section, it is also possible to coat the front flat part on the above-mentioned rear face of the major-diameter disk section with the gel matter instead of a

sheet. If it does in this way, it will become disposable-with gel material electrode tip structure, and handling will become still simpler.

[0031] A gel sheet can prevent fluctuation of an electroencephalogram signal, even if it excels in adhesion with the scalp and a test subject moves somewhat, since it has conductivity by the polymeric materials containing a lot of liquid components and has resiliency and adhesiveness. in order [ moreover, ] not to apply this gel sheet to the scalp unlike the conventional paste -- easy -- it can remove -- the scalp -- this sheet does not remain to a side For this reason, the shampoo after removing an electrode becomes completely unnecessary.

[0032] Now, if the structure of plug section 4P is explained more to a detail, opening (not shown) prepared in the core of the knob section 413 will be made to penetrate the axis end child 411, and the omission of the knob section 413 will be prevented by E form washer 412. A coil spring 415 has also achieved the duty of shock absorbing material with which the parts of the gel sheet 418 and the silver-silver chloride electrode chip 417 serve as a moderate pressure to the scalp while pressing it down by the pressure of a spring so that plug section 4P may not separate after it inserts the knob section 413 of the lower part of plug section 4P in receptacle section 4R. Under the knob section 411, as mentioned above, the maintenance metallic ornaments 416 in the air are formed, and the interior is held at the centrum in [ the gel sheet 418 and the silver-silver chloride electrode chip 417 ] one.

[0033] RESEKU tuple section 4R is the structure where the inner pipe 453 was inserted in the outside pipe 451 which has projection 452, the network cap 3 is put between the outside pipe 453 and the inner pipe 451, and the location of the RESEKUTABURU 4R itself is being fixed to it.

[0034] In order to attach plug section 4P in RESEKU tuple section 4R, downward gel sheet 418 and downward silver-silver chloride electrode chip 417 of an axis end child are inserted in the interior of the inner pipe 453 of RESEKU tuple section 4R attached in the network cap 3, the height 452 of RESEKU tuple section 4R is put into the notching section 414 of plug section 4P, and both take care not to fall out and separate. [ of plug section 4P ]

[0035] Now, where a head 7 is covered with the network cap 3 which has RESEKU tuple section 4R in which plug section 4P are not attached, the interior of the inner pipe 453 of RESEKU tuple section 4R is in an open condition visually, the hair can be seen through this open section, but since it is covered with the hair, the scalp is not visible. as [ press / then, / against the scalp / gather pipe 451 part with a finger outside this receptacle section 4R, and ] -- sensing -- coming out -- the scalp -- a field top is moved vertically and horizontally and the hair is pushed aside. Then, since the scalp is exposed to the pars basilaris ossis occipitalis of the inner pipe 453, if above plug section 4P are attached in receptacle section 4R in this condition, the gel sheet 418 as an electrode surface will contact the exposed scalp, and whenever [ electric contact ] will be improved.

[0036] In order for the hair to push aside and to expose the scalp, after changing into the condition of having covered the network cap 3 on the head, without attaching plug section 4P, the inner pipe 453 is lifted for a while, and the hair can be made easy to move and it can carry out also by spraying air strongly toward the hair of a pars basilaris ossis occipitalis. Furthermore, the rod for a hair \*\*\*\* division etc. may be put in into the inner pipe 453, the hair of a pars basilaris ossis occipitalis may be pushed aside, and the scalp may be exposed.

[0037] Drawing 4 , drawing 5 , and drawing 6 are a simplification perspective view at the time of wearing on the head which shows the modification of the headgear 2 shown in drawing 1 , and the top view of a configuration important section.

[0038] As shown in drawing 4 , the headgear 100 of this example equipped with belt part part

100b of a radial with possible eye tacking bee volume partial (bandanna part) 100a and bee volume partial 100a which have elasticity as shown in drawing 5 and drawing 6 , and has distributed the electrode 4 mentioned above into these parts.

[0039] As bee volume partial 100a is shown in drawing 6 , it consists of parts for a linear belt part, and, more specifically, the both ends have structure with possible eye tacking by piece-of-Velcro (trademark) 100c.

[0040] In case a head 1 is equipped with this headgear 100, belt part part 100b of the radial which shows bee volume partial 100a after wearing to drawing 5 is first hung down from the summit of a head 1, and it carries out [ tacking ] of the piece-of-Velcro 100d prepared at the tip for each belt part to bee volume partial 100a.

[0041] Since it can equip with bee volume partial 100a and belt part part 100b separately with this operation gestalt, it is not influenced by the size of a head and changing is also easy.

[0042] Moreover, if bee volume partial 100a is the ingredient which has elasticity (elasticity), where bee volume partial 100a is beforehand stopped by piece-of-Velcro 100c, this bee volume partial 100a can be extended inside, and a head can be covered entirely. Wearing of a headgear will become still simpler if it does in this way.

[0043] This invention sets it as one main purpose to put in practical use the electrode which does not use a paste, and even if it is high contact resistance, if the input impedance of the impedance converter which will be connected to the latter part of this electrode if stable in time is made more nearly enough [ than contact resistance ] to size, it will be that it is used about 100kohm, so that clearly from the above-mentioned explanation.

[0044] As mentioned above, although the operation gestalt of this invention was explained, this invention is not limited to this operation gestalt, and can consider various modification and an escape.

[0045] For example, although the above explanation explained the connector type electrode which consists of the plug section and the receptacle section for being cylindrical, as for this, it is needless to say that you may be the configuration of other arbitration. What is necessary is just the configuration which has opening whose interior can be seen in short where the receptacle section is attached. Moreover, the living body electrode structure of this invention is applicable to all that are contacted by living bodies, such as not only the application to the headgear for electroencephalogram measurement but the skin.

[0046]

[Effect of the Invention] As explained above, since the living body electrode structure by this invention becomes easy about the direct contact to a living body, it makes a minute electrical signal and ejection possible, and becomes easy [ wearing ].

[0047] Moreover, if this invention is applied to the headgear for electroencephalogram measurement, while the need for the shampoo after measurement is lost and wearing becomes easy, an unpleasant feeling of wearing will not be given. before [ furthermore, ] the tubed receptacle section equips with the plug section -- this -- the scalp -- the hair is pushed aside vertically and horizontally along a top, and the scalp can be exposed. For this reason, whenever [ electric contact / of an electrode ] becomes good, since gel slime was fixed to the electrode tip attached in the plug section, it excels in adhesion with the scalp, and since the destabilizing factor for measurement was lost, stable electroencephalogram measurement can be performed.

[0048] With the above-mentioned operation gestalt of this invention, the metal part also of a pain or an unpleasant feeling of wearing is directly lost in the scalp by having intervened this gel material sheet between the electrode tip and the scalp, and since it is the structure which removal

can do, and the electrode tip can be thrown away, it is sanitarially desirable. Furthermore, since a paste is not used in case an electrode is attached in the scalp, the remarkable effectiveness that the shampoo after removing an electrode is also unnecessary is acquired.

[Claim(s)]

[Claim 1] Living body electrode structure characterized by having the plug section which have a connection terminal for outputting outside the electrical signal acquired by the other end by said polar zone in fitting and the polar zone for being stopped and taking out the electrical signal from a living body at the end inside the cartridge-like receptacle section which have shaft orientations opening and have the cross section configuration of arbitration, and said receptacle section, and growing into it.

[Claim 2] Said receptacle section is living body electrode structure according to claim 1 which is the two-layer structure of the container liner section and the outer case section.

[Claim 3] Said polar zone is living body electrode structure according to claim 1 or 2 which is a silver-silver chloride electrode and is characterized by contacting a living body through the gel matter.

[Claim 4] Said plug section is living body electrode structure according to claim 1 to 3 characterized by having the press member which presses said polar zone.

[Claim 5] To the receptacle section of the living body electrode structure according to claim 1 to 4 attached in the mesh-like cap [ network ], said plug section is fitting and the headgear for electroencephalogram measurement which is stopped and changes.